FORM PTO-1390 (REV. 10-96) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 5054

U.S. APPLICATION NO (If known, see 37 CFR 1.5): 09/890655

INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/00652	28 January 2000	3 February 1999

TITLE OF INVENTION: An evaporator arrangement with a holding device for holding at least one sample...

APPLICANT(S) FOR DO/EO/US: FREYDL et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [X] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [ ] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [X] has been transmitted by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [X] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [X] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [X] have not been made and will not be made.
8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [ ] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [ ] Other items or information:

JC05 Rec'd PCT/PTO 03 AUG 2001

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/890655	PCT/EP00/00652	5054

17. [X] The following fees are submitted.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):	CALCULATIONS PTO USE ONLY
Search Report has been prepared by the EPO or JPO $860.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) $690.00	
No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) $760.00	
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO $1000.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $100.00	

ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	14 - 20 =	0	x 18.00	$	
Independent claims	1 - 3 =	0	x 80.00	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+270.00	$	
TOTAL OF ABOVE CALCULATIONS =				$	860.00
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also by filed (Note 37 CFR 1.9, 1.27, 1.28).				$	
SUBTOTAL =				$	860.00
Processing fee of $130.00 for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).			+	$	
TOTAL NATIONAL FEE =				$	860.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40.00 per property			+	$	
TOTAL FEES ENCLOSED =				$	860.00
				Amount to be: refunded	$
				charged	$

a. [X] A check in the amount of $ 860.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 19-2110. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

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Charles Fallow
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Charles W. Fallow
NAME

28,946
REGISTRATION NUMBER

Docket No. 5054

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the patent application of Freydl

Serial No. Not yet assigned

Filing date: August 3, 2001

Title: An Evaporator Arrangement with a Holding Device for Holding at Least one Sample Vessel...

Group Art Unit -- Examiner

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Before calculating the filing fee, please cancel claims 1-14, and add new claims 15-28 as on the attachment:

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August 3, 2001

15. An evaporator arrangement for evaporating samples held in a sample vessel, with a holding device for holding at least one sample vessel, said holding device comprising at least one receiving opening in which the sample vessel is insertable, wherein the receiving opening in a cooling section is provided with cooling means.

16. An evaporator arrangement according to claim 15, wherein the cooling section is arranged in an end region of the receiving opening.

17. An evaporator arrangement according to claim 16, wherein the cross section of the receiving opening tapers in the end region.

18. An evaporator arrangement according to claim 15, wherein the holding device is formed essentially of one piece of a block of heat-conducting material, and that the cooling section is formed by a cooling part inserted into the receiving opening.

19. An evaporator arrangement according to claim 18, wherein the cooling part is thermally insulated with respect to the block.

20. An evaporator arrangement according to claim 18, wherein the cooling part consists essentially of an outer part and of an inner part, between which there is formed a first annular gap for receiving a cooling medium, wherein the first annular gap is preferably sealed with respect to the receiving opening with sealing means.

21. An evaporator arrangement according to claim 18, wherein between the cooling part and the block there is formed a second annular gap which serves for receiving an insulation medium, in particular air.

22. An evaporator arrangement according to claim 15, wherein in the holding device there are incorporated channels for leading through a cooling fluid.

23. An evaporator arrangement according to claim 20, wherein in the block and in the outer part there are provided bores which are flush with one another, for forming a supply and drainage for the cooling medium, wherein in the case of a second annular gap this is bridged with connection tubelets.

24. An evaporator arrangement according to claim 18, wherein between the cooling part and the block there are provided sealing means for sealing the second annular gap with respect to the receiving opening.

25. An evaporator arrangement according to claim 15, with a sample vessel which is inserted or insertable into the receiving opening, wherein the outer diameter of the sample vessel and the free inner diameter of the receiving opening are selected in a manner such that between the sample vessel and the inner surface of the receiving opening there is provided a third annular gap for receiving a medium increasing the heat transfer.

26. An evaporator arrangement according to claim 15, wherein there are provided means for measuring and for setting the temperature of the cooling medium.

27. A method for evaporating a sample vessel, in particular in an evaporator arrangement according to claim 15, wherein the sample vessel during the evaporation is actively cooled in a region defining a residual volume.

28. A holding device for an evaporator arrangement according to claim 15, with at least one receiving opening into which a sample vessel is insertable and which in a cooling section is provided with cooling means.

PBU109/02.08.01/sx

12

Cancel claims 1-14
add new claims 15-28 as follows:

Patent claims

15. An evaporator arrangement (29) for evaporating samples held in a sample vessel (2), with a holding device (1) for holding at least one sample vessel (2), said holding device (1) comprising at least one receiving opening (3) in which the sample vessel (2) is insertable, ~~characterised in that~~ wherein the receiving opening (3) in a cooling section (4) is provided with cooling means (7, 8, 9, 10).

16. An evaporator arrangement according to claim 15, ~~characterised in that~~ wherein the cooling section (4) is arranged in an end region (5) of the receiving opening (3).

17. An evaporator arrangement according to claim 16, ~~characterised in that~~ wherein the cross section of the receiving opening (3) tapers in the end region (5).

18. An evaporator arrangement according to claims ~~1 to 3~~ 15, ~~characterised in that~~ wherein the holding device (1) is formed essentially of one piece of a block (6) of heat-conducting material, and that the cooling section (4) is formed by a cooling part (7) inserted into the receiving opening (3).

19. An evaporator arrangement according to claim ~~4~~ 18, ~~characterised in that~~ wherein the cooling part (7) is thermally insulated with respect to the block (6).

20. An evaporator arrangement according to claim ~~4 or 5~~ 18, ~~characterised in that~~ wherein the cooling part (7) consists essentially of an outer part (8) and of an inner part (9), between which there is formed a first annular gap (10) for receiving a cooling medium (P), wherein the first annular gap (10) is

preferably sealed with respect to the receiving opening (2) with sealing means (11).

7. An evaporator arrangement according to ~~one of the claims~~ 4 to 6, ~~characterised~~ wherein in that between the cooling part (7) and the block (6) there is formed a second annular gap (12) which serves for receiving an insulation medium (1), in particular air.

8. An evaporator arrangement according to one of the claims 1 to 7, ~~characterised~~ wherein in that in the holding device (2) there are incorporated channels ~~(13a, 13b, 14a, 14b, 15a, 15b)~~ for leading through a cooling fluid.

9. An evaporator arrangement according to ~~one of the claims~~ 6 to 8, ~~characterised in that~~ wherein in the block (6) and in the outer part (8) there are provided bores ~~(13a, 13b, 14a, 14b)~~ which are flush with one another, for forming a supply and drainage for the cooling medium (F), wherein in the case of a second annular gap (12) ~~according to claim 7~~ this is bridged with connection tubelets (15).

10. An evaporator arrangement according to ~~one of the claims~~ 4 to 9, ~~characterised~~ wherein in that between the cooling part (7) and the block (6) there are provided sealing means (16) for sealing the second annular gap (12) with respect to the receiving opening (3).

11. An evaporator arrangement according to ~~one of the claims~~ 1 to 10, with a sample vessel (2) which is inserted or insertable into the receiving opening (3), ~~characterised in that~~ wherein the outer diameter (D) of the sample vessel (2) and the free inner diameter (s) of the receiving opening (3) are se-

lected in a manner such that between the sample vessel (2) and the inner surface (21) of the receiving opening (3) there is provided a third annular gap (17) for receiving a medium (M) increasing the heat transfer.

12. An evaporator arrangement according to one of the claims 1 to 11, characterised in that there are provided means for measuring and for setting the temperature of the cooling medium (T).

13. A method for evaporating a sample in a sample vessel (2), in particular in an evaporator arrangement according to one of the claims 1 to 12, characterised in that the sample vessel (2) during the evaporation is actively cooled in a region defining a residual volume (R).

14. A holding device (1) for an evaporator arrangement (20) according to one of the claims 1 to 12, or for use in a method according to claim 13, with at least one receiving opening (3) into which a sample vessel (2) is insertable and which in a cooling section (4) is provided with cooling means (7, 8, 9, 10).

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An evaporator arrangement with a holding device for holding at least one sample vessel and a method for evaporating samples held in a sample vessel.

The invention relates to an evaporator arrangement with a holding device for holding at least one sample vessel and to a method for evaporating samples, with the features of the preamble of the independent patent claims.

On evaporating samples in evaporators it is known at the lower end of the sample vessel serving to receive the sample to attach a nipple. The purpose of this nipple is to achieve a definable residual volume of the sample during the evaporation.

For example from EP 501 665 there is known such a receptacle which simultaneously is provided with a sensor. The sensor serves for ending the evaporation as soon as the residual volume is reached.

Furthermore under the description "Rapid Vap" of the company Labconco there are known evaporators which use sample vessels which have a nipple for defining a residual volume. The sample receptacle is not heated in the region of the nipple so that an evaporation here is smaller.

The first mentioned solution however has the disadvantage that a sensor and corresponding electronics are necessary for the operation of the installation. Such an evaporator is therefore complicated in manufacture and operation and is correspondingly expensive.

The second mentioned solution has the disadvantage that always there is effected a certain heat transfer from the heated re-

gions of the sample vessel into the non-heated nipple. Furthermore the air which surrounds the nipple is heated. Also on account of this fact the nipple is heated. Finally the temperature of the nipple depends on the temperature of the surrounding air so that on operation of the evaporator the same conditions do not always prevail.

Sample vessels are usually held in a mounting by way of which they may be placed into an evaporator. Mountings in the manner of racks are known, which permit the simultaneous accommodation of several sample receptacles.

It is the object of the present invention to avoid the disadvantages of that which is known, in particular to create a holding device for holding sample receptacles in an evaporator which permits the evaporation of the sample up to an exactly predefinable residual volume. The holding device is to be usable in a conventional evaporator without complicated additional provisions. A further object of the invention lies in creating a method for evaporating a sample which permits the evaporation up to a predeterminable residual volume in the sample receptacle. Typically the holding device may be used in a vortex evaporator (as is described for example in CH 688 987).

According to the invention these objects are achieved with an evaporator with a holding device and with a method, with the features of the characterising part of the independent patent claims.

The holding device for holding at least one sample vessel in an evaporator is provided with at least one receiving opening. The sample vessel is insertable into the receiving opening. Typi-

cally the holding devce is designed as a rack which serves for receiving for example 6 or also more sample vessels.

In order at any time to ensure an evaporation up to an exactly predeterminable residual volume, the receiving opening in a cooling section is provided with cooling means. Thanks to the cooling means the temperature in the cooling section is set to a predeterminable value. The evaporation of the sample in the region of the cooling section is thus avoided. In the region of the cooling section thus an exactly predeterminable residual volume is not evaporated.

An active cooling has the advantage that heat transitions from heated sections of the holding device into the region of the cooling section are avoided.

The underlying conditions for the evaporation are furthermore always the same since the cooling means may cool the cooling section to a predeterminable value independently of the surrounding temperature.

Preferably the cooling section is arranged in an end region of the receiving opening. With this the lowermost part of the sample vessel is cooled so that in the lower section of the sample vessel the residual volume remains.

Advantageously the cross section of the receiving opening tapers in its end region. The tapering serves for receiving a nipple at the lower end of the sample vessel. The provision of the nipple permits with a cross section of the sample vessel, which is relatively large per se, to be able to exactly set a small residual volume.

The holding device is in a preferred embodiment example manufactured essentially as one piece out of a block of heat-conducting material. The receiving openings are incorporated in the block, for example drilled in. The block may for example consist of aluminium. The holding device may with this in an evaporator be placed directly onto the heating plate. By way of heat transfer from the heating plate onto the holding device a sample held in the sample vessel is evaporated by placing the sample vessel into the receiving opening.

The cooling section may in this case be formed by a cooling part placed into a lower section of the receiving opening.

The cooling part is advantageously thermally insulated with respect to the heated block. The cooling part may for example essentially be formed for example of an outer part and of an inner part, between which a first annular gap is formed for receiving a cooling medium. The first annular gap is at the same time advantageously sealed with respect to the receiving opening with sealing means, for example an O-ring.

The outer part may for the thermal insulation of the cooling part with respect to the holding device be manufactured of plastic material. The inner part is advantageously manufactured of metal so that a good heat transfer between the cooling medium flowing in the first annular gap and the sample vessel surrounded by the inner part is guaranteed.

Advantageously furthermore between the cooling part and the heatable block there is formed a second annular gap which serves for receiving the insulation medium. Typically the second annular gap is filled with air. The cooling medium flowing between the outer part and the inner part is thus thermally insulated

with respect to the heated remainder of the holding device by the provision of a second annular gap and by the formation of the outer part of a poor heat-conducting material.

The supply of the cooling medium into the first annular gap between the inner part and the outer part is effected preferably via channels which for leading through the cooling fluid are incorporated in the block and in the outer part.

Typically in the outer part and in the block there are provided bores which are flush with one another and which form the supply and drainage conduit for the cooling medium. Inasmuch as a second annular gap for forming an insulation is provided, this may be bridged with connection tubelets.

Between the cooling part and the block furthermore likewise sealing means for sealing any second annular gap towards the receiving opening may be provided.

The sealing means which seal the first and the second annular gap are in particular advantageous when the outer diameter of the sample vessel is selected smaller than the free inner diameter of the receiving opening. In this case in the third annular gap formed by way of this there may be added a medium which increases the heat transfer between the heated part of the mounting and the sample receptacle. Typically water may be applied.

The holding device or the evaporator equipped with the holding device may furthermore be provided with means for measuring and for setting the temperature of the cooling medium. In this manner the temperature in the region of the cooling section may be held within predetermined tolerance values. The holding device may be particularly simply placed in an evaporator with which

the sample vessels with their filling openings individually or in groups are connectable directly to a vacuum pump. The connection of a conduit for a cooling medium may in this case be particularly easily realised. Such an evaporator is described in the application EP 99810109.1 of the same applicant.

The method according to the invention is characterised in that a sample vessel which contains a sample to be evaporated, during the evaporation is actively cooled in a region defining a residual volume.

The invention is hereinafter described in more detail in embodiment examples and by way of the drawings. There are shown in:

Figure 1 a cross section through a holding device according to the invention, with an inserted sample vessel,

Figure 2 a schematic representation of a holding device for receiving several sample vessels,

Figure 3 an enlarged representation of the cooling section of the holding device according to Figure 1 in cross section,

Figure 4 a section through the holding device according to Figure 1 along the plane B-B and

Figure 5 a schematic representation of an evaporator arrangement according to the invention.

Figure 1 shows a holding device 1 in cross section. The holding device 1 consists essentially of a block 6 which is for example manufactured of aluminium.

In the block 6 there are incorportated receiving oepnings 3 which serve for inserting a sample vessel 2. For evaporation a sample is given into the sample vessel 2 which is inserted into the receiving opening 3.

For evaporating the sample held in the sample vessel 2 the block 6 may be placed on a heating plate of an evaporator (see Figure 5) and heated by way of this.

In an end region 5 of the receiving opening 3 there is provided a cooling section 4. In the cooling section 4 the cross section of the receiving opening 3 tapers. The tapering serves for receiving a nipple 18 attached on the lower end of the sample vessel 2. In the nipple 18 during the evaporation a part of the sample as a non-evaporated residual volume R is to remain.

The cooling section 4 is formed by a cooling part 7 which is inserted into the receiving opening 3 and which serves for cooling the cooling section 4 and the nipple 18.

The cooling part 7 consists essentially of an outer part 8 and of an inner part 9.

The outer part is manufactured of plastic material, for example polypropylene. The inner part 9 consists of metal, for example of aluminium.

Between the outer part 8 and the inner part 9 there is formed a first annular gap 10. The annular gap 10 serves for receiving a cooling fluid F. The cooling fluid F cools the inner part 9 and thus the nipple 18 of the sample vessel, which projects into the inner part.

The outer part 8 and the inner part 9 are for example screwed to one another with a screw 20.

Between the outer part 8 and the block 6 there is provided a second annular gap 12. The second annular gap 12 is filled with air 1. The air 1 in the second annular gap serves for the thermal insulation of the cooling part 7 with respect to the block 6. The design of the outer part of plastic material likewise serves for the thermal insulation.

The cooling fluid F is led via a bore 13a in the block 6 and through a bore 14a in the outer part into the first annular gap 10. The second annular gap 12 is bridged with a connection tubelet 15a which connects the bore 13a to the bore 14a.

The leading away of the cooling fluid from the first annular gap 10 is effected in a similar manner through the bore 14b in the outer part 18, a connection tubelet 15b and a bore 13b in the block 6.

By way of continuous circulation of the cooling medium F through the annular gap 10 the sample vessel 2 is cooled in the region of the nipple 18. In this region therefore no evaporation is effected so that an exactly definable residual volume R of the sample remains.

For increasing the heat transfer between the block 6 and the upper section of the sample vessel 2 the intermediate space between the outer wall of the sampel vessel 2 and the inner wall 17 of the block 6, which forms the receiving opening 3 is filled with a medium which improves the heat exchange, for example water W. For this consciously the outer diameter d of the sample

vessel 2 is selected smaller than the free diameter D of the receiving opening 3.

In order to prevent the entering of the water W into the first annular gap 10 or into the second annular gap 12 there are provided sealing means.

A first O-ring 11 is provided for sealing the first annular gap 10 with respect to the receiving opening 3. A second O-ring 16 seals the second annular gap 12 with respect to the receiving opening 3, in particular with respect to the third annular gap 17 formed between the sample vessel 2 and the inner wall of the receiving opening 3.

As a cooling medium advantageously likewise water is used. For cooling, a commercially available cooling unit with a circulation pump outside the holding device may be used. Typically in operation 1000 ml of cooling fluid with a temperature of 10°C are circulated per hour. The holding device 1 comprises typically several receiving openings 3 for receiving sample vessels 2 which are designed identically to the receiving opening 3 shown in Figure 1.

In Figure 2 there is schematically shown a holding device 1 which is formed of a block 6 which comprises a multitude of receiving openings 3 for receiving sample vessels 2. An individual sample vessel 2 is shown inserted into an opening. The cooling medium F is supplied and led away via a connection 19a, 19b respectively.

Figure 3 shows an enlarged cutout of the representation of Figure 1, in particular in the region of the cooling part 7. The

cooling part 7 defines a cooling section 4 which is located in an end section 5 of the receiving opening 3.

The cooling medium F flows through the first annular gap 10 and with this cools the inner part 9 such that also the nipple 18 surrounded by the inner part 9 is cooled. By way of this the evaporation of the residual volume R is avoided.

In Figure 4 there is shown a section through the holding device 1 in the region of the cooling part 7, along the plane B-B of Figure 1.

In the end region 5 of the receiving opening 3 in the block 6 the cooling part 7 is attached (see Figures 1 and 3). The cooling part 7 consists of the outer part 8 and of the inner part 9 between which there is formed a first annular gap 10.

A second annular gap 12 is formed between the receiving opening 3 tapered in the end region 5 and the outer part 8.

Through a bore 13b in the block 6 which is connected via a connection tubelet 15b to a bore 14b, the cooling fluid F is led away out of the first annular gap 10. By way of the cooling fluid F the inner part 9 and with this the nipple 18 touching the inner surface of the inner part 9 are cooled.

The second annular gap 12 is filled with air 1 for the thermal insulation.

In Figure 4 in dashed lines there is furthermore shown the inner surface 21 of the receiving opening 3 above the tapering.

Figure 5 shows an evaporator arrangement 29 according to the invention. The evaporator arrangement 29 comprises a heating plate 30 on which the holding device 1 is placed. The holding device 1 is designed in the manner shown in the preceding drawings. The holding device 1 comprises receiving openings 3 for receiving several sample vessels. In an end region 5 of the receiving openings there is provided a cooling section 4. The cooling section 4 serves for cooling a nipple 18 of the sample vessels 2. The individual cooling sections 4 are connected amongst one another by channels 13a, 13b for a cooling medium F. The evaporator arrangement 29 comprises a cooling medium conduit 32a, 32b which is connectable to a connection 19a, 19b of the holding device 1.

Additionally the evaporator arrangement 29 may be provided with a motor for moving the heating plate 30. Such vortex evaporators are known per se.

The evaporator arrangement 29 is provided with a connection plate 33 which may be placed onto the openings of the sample vessels 2. The connection plate 33 is via connections 31 connected to a vacuum pump (not shown). In this manner the sample vessels 2 may be simply evacuated. Simultaneously the supply of the cooling medium F onto the holding device is possible without any problem.

Patent claims

1. An evaporator arrangement (29) for evaporating samples held in a sample vessel (2), with a holding device (1) for holding at least one sample vessel (2), said holding device (1) comprising at least one receiving opening (3) in which the sample vessel (2) is insertable, characterised in that the receiving opening (3) in a cooling section (4) is provided with cooling means (7, 8, 9, 10).

2. An evaporator arrangement according to claim 1, characterised in that the cooling section (4) is arranged in an end region (5) of the receiving opening (3).

3. An evaporator arrangement according to claim 2, characterised in that the cross section of the receiving opening (3) tapers in the end region (5).

4. An evaporator arrangement according to claims 1 to 3, characterised in that the holding device (1) is formed essentially of one piece of a block (6) of heat-conducting material, and that the cooling section (4) is formed by a cooling part (7) inserted into the receiving opening (3).

5. An evaporator arrangement according to claim 4, characterised in that the cooling part (7) is thermally insulated with respect to the block (6).

6. An evaporator arrangement according to claim 4 or 5, characterised in that the cooling part (7) consists essentially of an outer part (8) and of an inner part (9), between which there is formed a first annular gap (10) for receiving a cooling medium (F), wherein the first annular gap (10) is

preferably sealed with respect to the receiving opening (3) with sealing means (11).

7. An evaporator arrangement according to one of the claims 4 to 6, characterised in that between the cooling part (7) and the block (6) there is formed a second annular gap (12) which serves for receiving an insulation medium (I), in particular air.

8. An evaporator arrangement according to one of the claims 1 to 7, characterised in that in the holding device (1) there are incorporated channels (13a, 13b, 14a, 14b, 15a, 15b) for leading through a cooling fluid.

9. An evaporator arrangement according to one of the claims 6 to 8, characterised in that in the block (6) and in the outer part (8) there are provided bores (13a, 13b, 14a, 14b) which are flush with one another, for forming a supply and drainage for the cooling medium (F), wherein in the case of a second annular gap (12) according to claim 7 this is bridged with connection tubelets (15).

10. An evaporator arrangement according to one of the claims 4 to 9, characterised in that between the cooling part (7) and the block (6) there are provided sealing means (16) for sealing the second annular gap (12) with respect to the receiving opening (3).

11. An evaporator arrangement according to one of the claims 1 to 10, with a sample vessel (2) which is inserted or insertable into the receiving opening (3), characterised in that the outer diameter (D) of the sample vessel (2) and the free inner diameter (s) of the receiving opening (3) are se-

lected in a manner such that between the sample vessel (2) and the inner surface (21) of the receiving opening (3) there is provided a third annular gap (17) for receiving a medium (W) increasing the heat transfer.

12. An evaporator arrangement according to one of the claims 1 to 11, characterised in that there are provided means for measuring and for setting the temperature of the cooling medium (F).

13. A method for evaporating a sample in a sample vessel (2), in particular in an evaporator arrangement according to one of the claims 1 to 12, characterised in that the sample vessel (2) during the evaporation is actively cooled in a region defining a residual volume (R).

14. A holding device (1) for an evaporator arrangement (29) according to one of the claims 1 to 12, or for use in a method according to claim 13, with at least one receiving opening (3) into which a sample vessel (2) is insertable and which in a cooling section (4) is provided with cooling means (7, 8, 9, 10).

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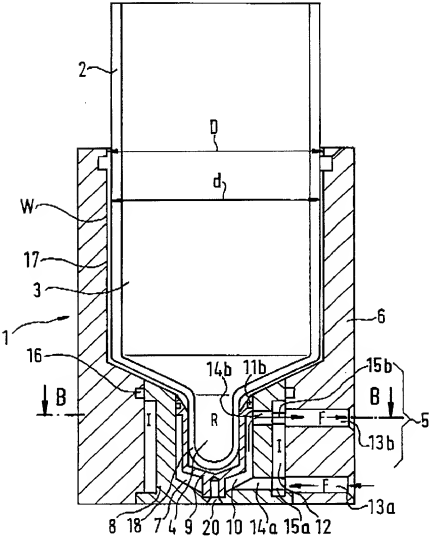


Fig.1

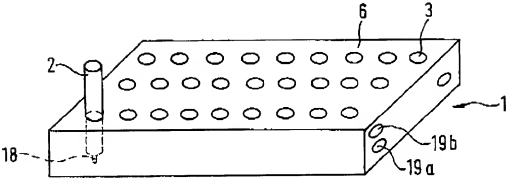


Fig. 2

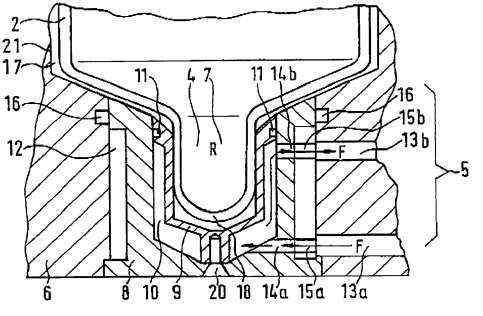


Fig.3

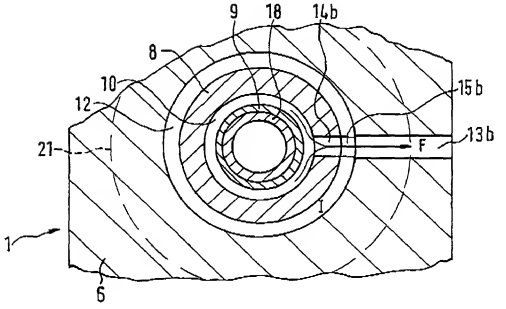
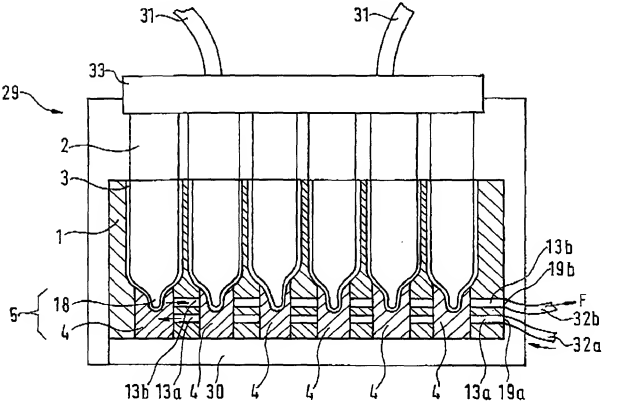

9
18
14b
8
10
15b
12
13b
F
21
1
1
6

Fig.4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31
33
29
2
3
1
13b
19b
5
18
F
32b
4
32a
13b 13a 4 30 4 4 4 4 13a 19a

Fig.5

09/890

Attorney's Docket No. _____

☐ Original Application
☒ PCT National Application—U.S. Designated Office
☐ Continuation-in-Part Application

COMBINED DECLARATION, PETITION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

An evaporator arrangement with a holding device for holding at least one sample vessel ...

☐ the specification of which

☐ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and was amended on _____ (if applicable)

☒ which is described in international application no. PCT/EP00/00652 filed 28 January 2000

and as amended on _____ (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I do not know and do not believe that the same was ever known or used in the United States before my or our invention thereof or patented or described in any printed publication in any country before my or our invention thereof more than one year prior to this application or said international application, that the same was not in public use or on sale in the United States of America more than one year prior to this application or said international application, that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application or said international application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application or said international application and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application or said international application by me or my legal representatives or assigns except as identified below.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Number	Country	Date of Filing (day, month, year)	Priority Claimed
99 810 088.7	EP	03/02/1999	☒ yes ☐ no
			☐ yes ☐ no
			☐ yes ☐ no
			☐ yes ☐ no
			☐ yes ☐ no

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the United States Patent and Trademark Office connected therewith:
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Allen P. Rosenberg, Reg. No. 24,946; and Charles W. Fallow, Reg. No. 28,946

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I hereby petition for grant of a United States Letters Patent on this invention.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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RESIDENCE	CITIZENSHIP	
POST OFFICE ADDRESS		